

CLAIMS

WHAT IS CLAIMED IS:

- 5       1. An expandable device, comprising:

an expansion member having a plurality of cells that  
are expandable from a closed position to an open  
position, each cell having a thin strut pivotably  
coupled to a thick strut.

- 10      2. The expandable device as recited in claim 1, wherein  
the thin strut and the thick strut of each cell are pivotably  
coupled by a pin joint.

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3. The expandable device as recited in claim 1, wherein  
the thin strut and the thick strut of each cell are pivotably  
coupled by a ball and socket joint.

- 20      4. The expandable device as recited in claim 1, wherein  
the thin strut is coupled between a fixed end and a pivotable  
end.

5. The expandable device as recited in claim 1, wherein  
the expansion member comprises a tubular that undergoes radial  
expansion during expansion of the plurality of cells.

5 6. An expandable device , comprising:

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an expansion member having a plurality of cells that  
are expandable from a closed position to an open  
position, each of the plurality of cells  
comprising a thick strut, a first thin strut and  
a second thin strut.

10 7. The expandable device as recited in claim 6, wherein  
the first thin strut is physically connected to the second thick  
15 strut and the second thin strut is disposed in abutting  
engagement with the thick strut.

20 8. The expandable device as recited in claim 6, wherein  
the first thin strut and the second thin strut are generally  
parallel.

9. The expandable device as recited in claim 6, wherein  
the first thin strut is longer than the second thin strut.

10. The expandable device as recited in claim 6, wherein  
the expansion member comprises a tubular.

5       11. An expandable device, comprising:

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an expansion member having a plurality of cells that  
are expandable from a closed position to an open  
position, each of the plurality of cells  
comprising a spring member to hold the cell in  
the open position.

10       12. The expandable device as recited in claim 11, wherein  
the spring member comprises a horn.

15       13. The expandable device as recited in claim 11, wherein  
the spring member comprises a pair of horns.

20       14. The expandable device as recited in claim 13, wherein  
a thin strut and a thick strut extend between the pair of horns.  
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15. The expandable device as recited in claim 11, wherein  
each cell comprises a double horn cell.

16. The expandable device as recited in claim 11, wherein each spring member comprises an undulating spring member.

5       17. The expandable device as recited in claim 11, wherein the expandable member comprises a tubular that undergoes radial expansion during expansion of the plurality of cells.

10      18. An expandable device, comprising:

15                  an expansion member having a plurality of cells that are expandable from a closed position to an open position, each of the plurality of cells comprising a thick strut and a thin strut, the thin strut having a plurality of flexible joints.

19. The expandable device as recited in claim 18, wherein each flexible joint comprises a thinned region.

20      20. The expandable device as recited in claim 19, wherein each thinned region undergoes plastic deformation during expansion from the closed position to the open position.

21. The expandable device as recited in claim 18, wherein  
the expansion member comprises a tubular.

22. An expandable device, comprising:

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an expansion member having a plurality of cells that  
are expandable from a closed position to an open  
position, each cell having a thin strut coupled  
to a thick strut by a ligament.

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23. The expandable device as recited in claim 21, wherein  
the thin strut and the thick strut of each cell are pivotably  
coupled by a pin joint.

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24. The expandable device as recited in claim 21, wherein  
the thin strut and the thick strut of each cell are pivotably  
coupled by a ball and socket joint.

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25. The expandable device as recited in claim 21, wherein  
the thin strut is coupled between a fixed end and a pivotable  
end.

26. A method of expanding a device, comprising:

creating a plurality of bistable cells in a wall of  
the device by coupling thin struts to  
corresponding thick struts through hinge joints;  
and

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applying an expansion force to the wall in a direction that transitions the plurality of bistable cells from a contracted state to an expanded state.

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27. The method as recited in claim 26, further comprising forming a plurality of locking mechanisms in the wall.

28. The method as recited in claim 26, wherein creating  
15 comprises coupling each thin strut to a corresponding thick  
strut through a pivotable hinge joint.

29. The method as recited in claim 26, wherein creating  
comprises coupling each thin strut to a corresponding thick  
strut through a flexible hinge joint.  
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30. The method as recited in claim 26, wherein creating comprises coupling each thin strut to a corresponding thick

strut by a hinge joint having a plastically deformable thinned region.

31. The method as recited in claim 26, wherein creating  
comprises creating the plurality of bistable cells in a tubular.

32. The method as recited in claim 31, wherein applying  
comprises applying a force in a radially outward direction.

10 33. The method as recited in claim 26, further comprising  
coupling at least one thin strut to the at least one thick strut  
by a spring member.

15 34. The method as recited in claim 26, further comprising  
coupling at least one thin strut to the at least one thick strut  
by a horn spring member.

35. An apparatus, comprising:

20 an expandable member having a plurality of cells that  
are expandable from a closed position to an open  
position, the plurality of cells comprising cells  
of differing sizes.

36. The apparatus as recited in claim 35, wherein the expandable member comprises a tubular.

5 37. An apparatus, comprising:

an expandable member having a plurality of cells that  
are expandable from a closed position to an open  
position, the plurality of cells comprising cells  
of differing configurations.  
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38. The apparatus of claim 37, wherein the expandable member comprises a tubular.